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New and interesting mites from the Geneva Museum LXVII. Soil inhabiting Ptychoid Oribatids from Malaysia (Acari: Oribatida)

by

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With 74 figures

ABSTRACT

New and interesting mites from the Geneva Museum LXVII. Soil inhabiting Ptychoid Oribatids from Malaysia (Acari: Oribatida). — A study of "Ptychoid" Oribatid mites originating from Malaysian soil samples is presented. Twelve species and one subspecies out of the examined eighteen species proved to be new to science.

INTRODUCTION

On the request of Dr. B. Hauser (Curator of the Arthropoda collections at the Muséum d'Histoire naturelle, Geneva), T. Jaccoud (taxidermist at the same Museum) and his companion P. Marcuard (Geneva) collected soil samples in Malaysia.

The samples contain a very large number of species, obviously requiring quite some time to complete their study; therefore, I present herewith only the species belonging to the "Ptychoid" Oribatid-groups. I discuss 18 species representing 3 superfamilies (*Mesoplophoroidea* van der Hammen, 1959, *Phthiracaroidea* Perty, 1841 and *Euphthiracaroidea* Grandjean, 1967), 6 families and 8 genera.

The problems of identification and the definition of some new species necessitate the survey of the whole genus *Apoplophora* Aoki, 1980; for this purpose I give an identification key for all the heretofore known species. Some other problems were addressed in connection with *Hoplophorella scapellata* Aoki, 1965; having re-examined

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the type-series of *Hoplophorella lienhardi* Mahunka, 1987 I am able to separate the two species.

Examination of this material suggests some interesting zoogeographical relationships between Sabah and the Malayan Peninsula through, for example, the discovery in Malaysia of a second species of *Sabahtritia* Mahunka, 1987! The length, height and width measurements reflect the smallest and highest values taken. When a long series of specimens was available at least five measurements of each were recorded.

LIST OF LOCALITIES

- i 34: Malaisie (Perak): Cascade de Sungei Simei (Cameron Highlands) 25.III.1977. leg. T. Jaccoud et P. Marcuard.
- i 52: Malaisie (Pahang): Panching 11.III.1977. leg. T. Jaccoud et P. Marcuard.
- i 61: Malaisie (Perak): Cascade de Sungei Simei (Cameron Highlands) 25.III.1977. leg. T. Jaccoud et P. Marcuard.
- i 74: Malaisie (Pahang): Temerloh 9.III.1977. leg. T. Jaccoud et P. Marcuard.
- i 82: Malaisie (Pahang): Tanah Rata 24.III.1977. leg. T. Jaccoud et P. Marcuard.
- i 85: Malaisie (Perak): Cascade de Sungei Simei (Cameron Highlands) 28.III.1987. leg. T. Jaccoud et P. Marcuard.
- i 96: Malaisie (Pahang): Berinchang (Cameron Highlands) 26.III.1977. leg. T. Jaccoud et P. Marcuard.
- i 100: Malaisie (Pahang): Panching 11.III.1977. leg. T. Jaccoud et P. Marcuard.

LIST OF IDENTIFIED SPECIES

Apoplophoridae Niedbala, 1984

- Apoplophora cristata* sp. n.
- Apoplophora jaccoudi* sp. n.
- Apoplophora malaya* sp. n.
- Apoplophora marcuardi* sp. n.
- Apoplophora triseta* sp. n.

Mesoplophoridae Grandjean, 1965

- Mesoplophora (Parplophora) paraleviseta* sp. n.

Phthiracaridae Perty, 1841

- Hoplophorella cucullata* (Ewing, 1909)
Locality: i 100: 1 specimen
- Hoplophorella floridiae* Jacot, 1933
Locality: i 74: 4 specimens
- Hoplophorella scapellata* Aoki, 1965
Localities: i 52: 10 specimens; i 61: 9 specimens; i 74: 3 specimens
- Hoplophthiracarus minor* sp. n.
- Hoplophthiracarus nasalis* sp. n.
- Hoplophthiracarus proximus* Niedbala, 1984
Localities: i 61: 12 specimens; i 100: 7 specimens

Oribotritiidae Grandjean, 1954

- Austrotritia shealsi* Mahunka, 1987
Localities: i 85: 2 specimens; i 96: 8 specimens

Euphthiracaridae Jacot, 1930*Rhysotritia clavata spiculifera* ssp. n.*Rhysotritia divida* sp. n.*Rhysotritia hauseri* sp. n.*Sumatrotritia elegans* sp. n.**Sabahtritiidae** Mahunka, 1987*Sabahtritia mirabilis* sp. n.

DESCRIPTIONS

Genus Apoplophora Aoki, 1980

The genus was revised by NIEDBALA (1984) and its species were surveyed by MAHUNKA (1987b), but at the time of completing my manuscript (1984) I was not aware of Niedbala's paper.

The present material contains several *Apoplophora* species, the identification of which necessitates a repeated investigation of the earlier species.

Concerning the species-characters my opinion differs from that of NIEDBALA (e.g. in the importance of the sculpture of the prodorsum and of notogaster). Recently I examined more than 120 specimens of several species of this genus and I have found no transitional variability between the sculptured and unsculptured forms. On this basis *Apoplophora rostrorugosa* (Hammer, 1979) is a valid species, and apparently the synonymization by NIEDBALA (1984) of *A. remota* Aoki, 1980 was perhaps premature. The number of branches of the sensillus and of the setae was also often not exactly given by the authors. On the basis of some re-examined species I give this number correctly in the key for the *Apoplophora* species.

Apoplophora cristata sp. n.

Measurements. – Length of aspis: 200-232 μm , length of notogaster: 275-296 μm , height of notogaster: 191-210 μm .

Aspis: A conspicuous stronger lateral carina and some other fine lines present on the prodorsal surface. Lateral carina bent anteriorly and laterally, connected with the lateral rim (Fig. 1). Laterobasal corner also striate. Conspicuous differences in length between the prodorsal setae: *ex* (57 μm) < *in* (73 μm) < *le* (88 μm) < *ro* (93 μm). All setae densely ciliate. Sensillus with 36-40 comparatively long branches (Fig. 3).

Notogaster: Lateral margin of notogaster serrate medially (Fig. 1). Eight pairs of nearly equally thick notogastral setae present, setae *c*₁ (75 μm) and *d*₁ much shorter than *cp* (96 μm). All densely ciliate.

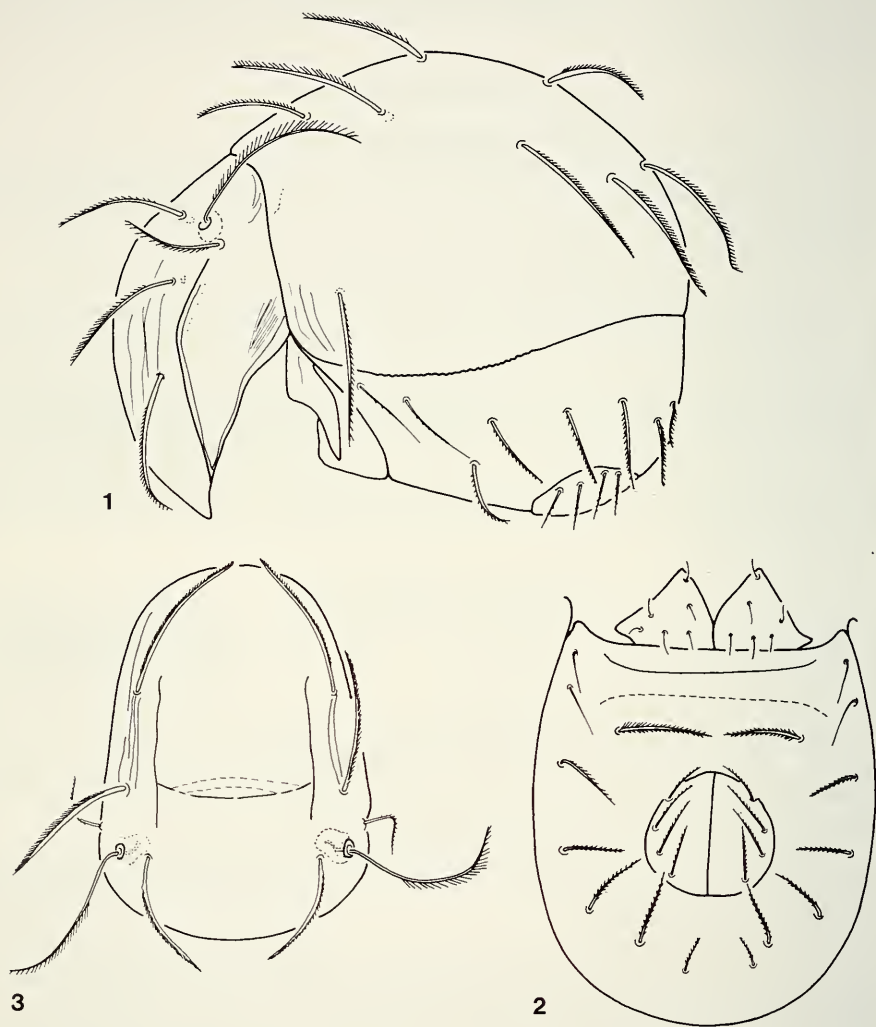
Ventral side (Fig. 2): Ventral plate with eight pairs of setae, two pairs of them in the aggenital position. These two latter pairs much thinner than the other setae. Setae *v*₁ nearly half as long as *v*₂, setae *v*₁-*v*₆ strongly ciliate, similar to notogastral setae. Anal plates with four pairs of strong, rigid setae, all directed more or less forwards.

Material examined: Holotype: i 74; 5 paratypes: from the same sample. Holotype and 3 paratypes: MHNG¹, 2 paratypes (1293-PO-88): HNHM².

¹: MHNG = deposited in the Muséum d'Histoire naturelle, Genève.

²: HNHM = deposited in the Hungarian Natural History Museum, Budapest, with identification number of the specimens in the Collection of Arachnida.

R e m a r k s : The new species is well characterized by the strong lateral carina and the serrate notogastral margin. These two features are unknown in the previously described *Apoplophora* species.



FIGS 1-3.

Apoplophora cristata sp. n. — 1: body from lateral view, 2: anogenital region, 3: aspis.

***Apoplophora jaccoudi* sp. n.**

Measurement. – Length of aspis: 246-257 μm , length of notogaster: 335-350 μm , height of notogaster: 221-240 μm .

Aspis: Its surface smooth, only the laterobasal corner with some short lines. Setae comparatively short, with a striking difference in length between interlamellar (57 μm) and exobothridial (46 μm) setae (Fig. 6), the latter also thinner and less ciliate than the former ones. All setae densely ciliate, cilia sparser on the distal end than on the proximal part. Sensillus long, with 38-40 branches.

Notogaster: All notogastral setae strong, nearly equal in thickness. Setae c_1 and d_1 much shorter than c_3 ; c_2 stands much farther on the anterior margin of the notogaster than setae c_1 or c_3 (Fig. 4).

Ventral side (Fig. 5): Six pairs of setae in adanal, two pairs in aggenital position. Latter setae are thin and smooth, and also shorter than the thick and densely ciliate preceding ones. Four pairs of anal setae also ciliate.

Material examined: Holotype: i 74; 20 paratypes: from the same sample; 3 paratypes: i 52. Holotype and 14 paratypes: MHNG, 9 paratypes (1294-PO-88); HNHM.

Remarks: The new species stands close to *A. pantotrema* (Berlese, 1913). It is distinguished from it by the number of the aggenital setae.

I dedicate the new species to one of the collectors, Mr. T. Jaccoud (Geneva Museum).

***Apoplophora malaya* sp. n.**

Measurements. – Length of aspis: 305-374 μm , length of notogaster: 379-473 μm , height of notogaster: 227-265 μm .

Aspis: Rostrum serrate anteriorly (Fig. 10), prodorsal surface ornamented by longitudinal striation. Lateral part smooth, but some striae also visible basally (Fig. 8). Lateral carina conspicuous. Interlamellar setae slightly longer than lamellar ones, exobothridial setae the shortest among the prodorsal setae. Sensillus with 11-13 branches.

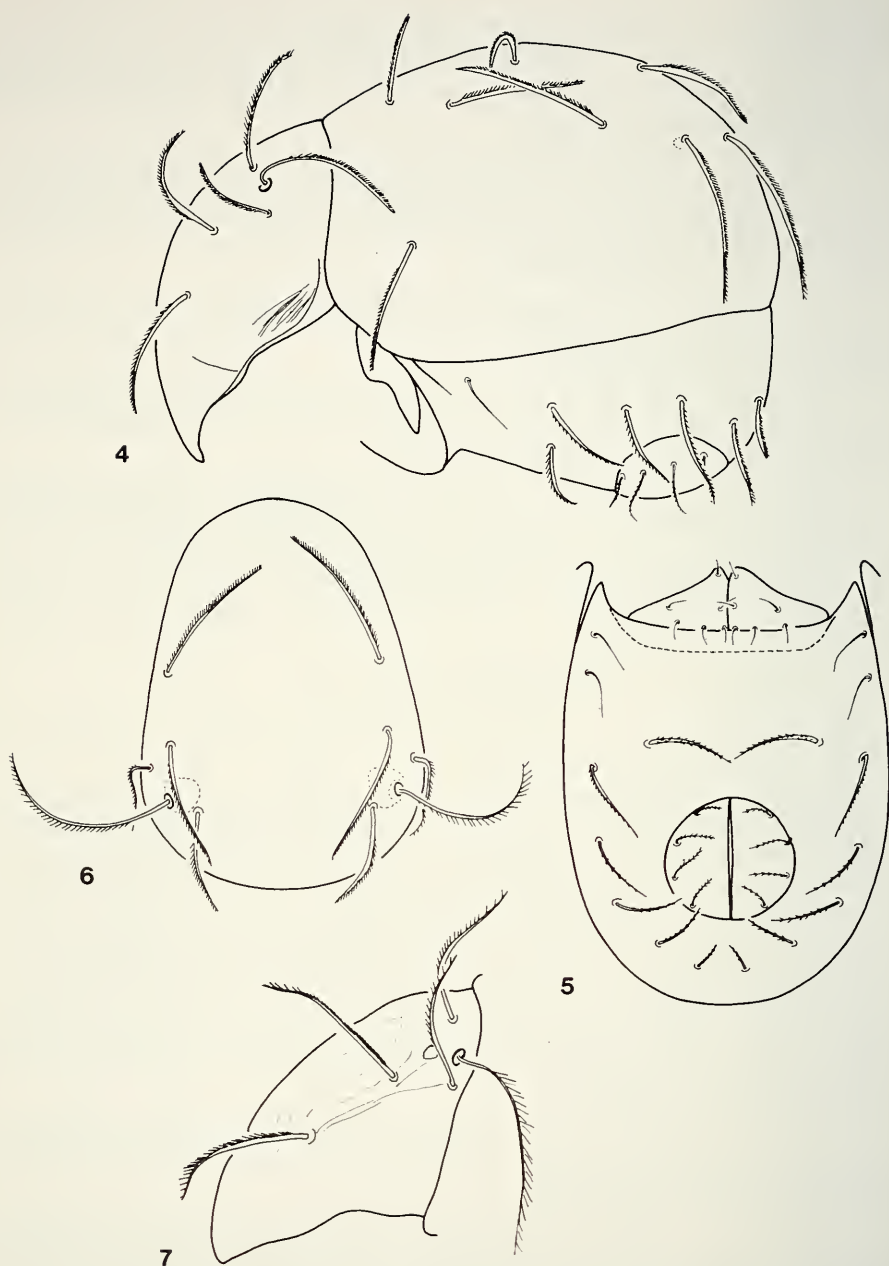
Notogaster: Eight pairs of notogastral setae of various lengths, one of them (c_3) very fine*, without ciliation. All others strong, slightly thickened and normally ciliate.

Ventral side: Ventral plate (Fig. 9) with 8 pairs of setae. Two of them in aggenital position, anterior one short, thin and fine, posterior one ciliate, like the others. Setae v_1 shorter but thicker than setae v_2 - v_6 . Six pairs of genital, four pairs of anal setae present. Setae an_1 and an_2 arising medially, an_3 and an_4 laterally on the anal plate (Fig. 11). Anal setae also densely ciliate.

Material examined: Holotype: i 96; 20 paratypes (2 tritonymphs); from the same sample. Holotype and 12 (1 tritonymph) paratypes: MHNG, 8 paratypes (1 tritonymph) (1295-PO-88); HNHM.

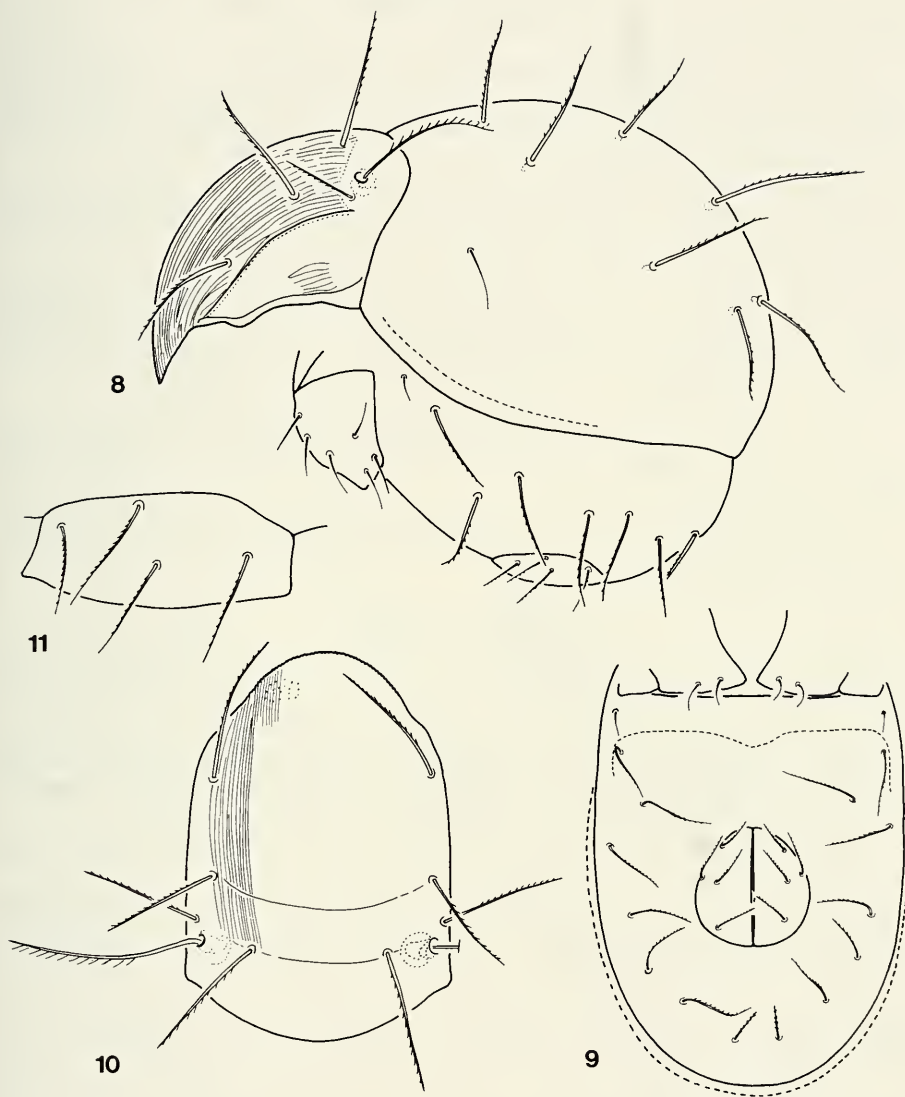
Remarks: The new species is well characterized by the 2 pairs of aggenital setae and the heterotrichy of the notogaster. On this basis it stands nearest to *A. heterotricha* Mahunka, 1987 from Sabah; however, the latter species is much smaller, its prodorsum is smooth and two pairs of equally long aggenital setae are present.

*: It is also conspicuous in the tritonymph.



FIGS 4-7.

Apoplophora jaccoudi sp. n. – 4: body from lateral view, 5: anogenital region, 6: aspis.
Apoplophora indica (Mahunka, 1985) – 7: aspis from lateral view.



FIGS 8-11.

Apoplophora malaya sp. n. – 8: body from lateral view, 9: anogenital region, 10: aspis, 11: anal plate.

***Apoplophora marcuardi* sp. n.**

M e a s u r e m e n t s . – Length of aspis: 270 μm , length of notogaster 350 μm , height of notogaster: 236 μm .

A s p i s : Surface closely striated, but striae not reaching over the insertion of the interlamellar setae. Prodorsal setae – with the exception of exobothridial ones – strong, thick and densely barbed. Exobothridial setae much finer than the others. Sensillus with more than 40 short branches (Fig. 14).

N o t o g a s t e r : Whole surface covered with spines, which are connected by short crests (Fig. 12). Lateral margin serrate. Eight pairs of strong, densely ciliate notogastral setae present, cilia in two parallel lines. Setae c_3 much longer than setae c_1 .

V e n t r a l s i d e (Fig. 13): Eight pairs of conspicuous setae. Two pairs of them in aggenital position (Fig. 15), ag_1 much shorter and finer than the posterior one. Among the ventral setae, ag_1 short, only half as long as v_2 . All considerably ciliate, similar to the notogastral setae. Four pairs of setae on the anal plate also strong and ciliate.

M a t e r i a l e x a m i n e d : Holotype: i 61; deposited in the MHNG.

R e m a r k s : The new species stands close to *A. ornatissima* Mahunka, 1988, however, the ventral plate in the latter is ornamented and the aggenital setae are of equal length and equal thickness (Fig. 16).

I dedicate the new species to Mr. P. Marcuard (Geneva), for his help in the collection of this very rich material.

***Apoplophora triseta* sp. n.**

M e a s u r e m e n t s . – Length of aspis: 210–237 μm , length of notogaster: 276–295 μm , height of notogaster: 153–173 μm .

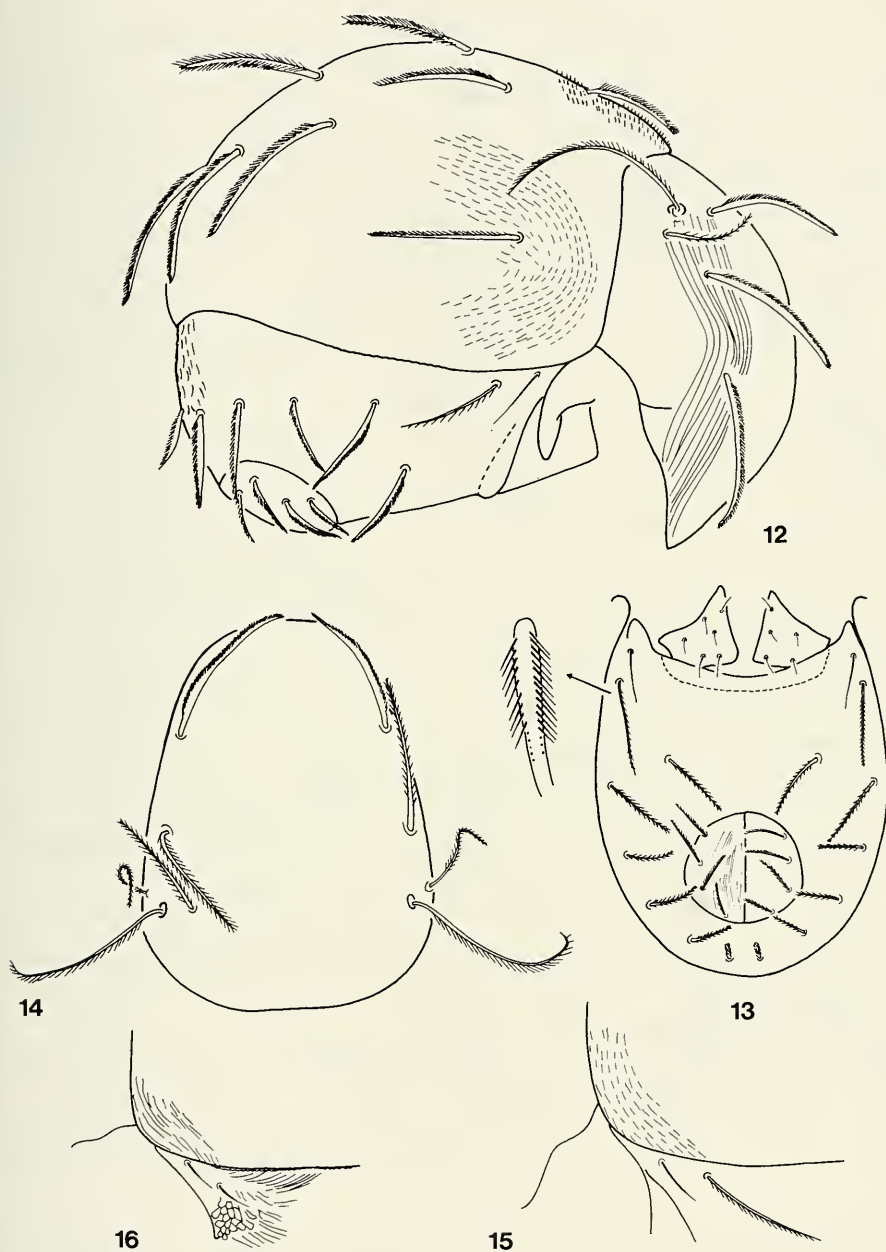
A s p i s (Fig. 19): Without any dorsal sculpture, only the laterobasal corner lineate. Among the prodorsal setae significant differences in length exist: setae *ex* much shorter and finer than the others, setae *ro* the longest of all. Exobothridial setae sparsely ciliate, all others densely ciliate. Sensillus with more than 40 long branches.

N o t o g a s t e r (Fig. 17): Eight pairs of equally thick setae, setae c_2 and c_3 much longer than c_1 , also d_1 and e_2 very long.

V e n t r a l s i d e (Fig. 18): Eight pairs of setae present. Two of them in aggenital position, much thinner than the others, $ag_1 > ag_2$. Setae v_1 shorter than v_2 . Three pairs of setiform but densely ciliate anal setae.

M a t e r i a l e x a m i n e d : Holotype: i 61; 3 paratypes: from the same sample; 4 paratypes: i 34; 3 paratypes: i 85. Holotype and 6 paratypes: MHNG, 4 paratypes (1296-PO-88): HHNM.

R e m a r k s : The new species is the first *Apoplophora* species with 3 pairs of anal setae. On this basis it is distinguished from all the other heretofore known species.



FIGS 12-16.

Apoplophora marcuardi sp. n. – 12: body from lateral view, 13: anogenital region, 14: aspis, 15: aggenital setae.

Apoplophora ornatissima Mahunka, 1988 – 16: aggenital setae.



FIGS 17-19.

Apoplophora triseta sp. n. — 17: body from lateral view, 18: anogenital region, 19: aspis.

KEY FOR THE DETERMINATION OF SPECIES OF *Apoplophora* Aoki, 1980

- 1 (16) At least the dorsal surface of the aspis ornamented by longitudinal lines or striae.
- 2 (5) Both the aspis and the whole notogaster ornamented by sculpture.
- 3 (4) Sensillus at most with twenty branches; whole basal part of the aspis striate; ventral setae in aggenital position very short and fine, much shorter than the other setae of the ventral plate *ornatissima* Mahunka 1988
- 4 (3) Sensillus with more than forty branches; basal part of prodorsum, behind the interlamellar setae, smooth; ventral setae in aggenital position long, the posterior one thick, like the other setae of ventral plate and densely ciliate . . *marcuardi* sp. n.
- 5 (2) Notogastral setae lacking sculpture, at most some lines are visible on the shoulder.
- 6 (9) Sculpture of aspis consisting of sparse lines.
- 7 (8) A pair of strong lateral carinae present. Sensillus with more than 40 short branches *cristata* sp. n.
- 8 (7) Lateral carinae absent, on the surface only very fine lines visible (Fig. 7). Sensillus with about 20-25 branches* *indica* (Mahunka, 1985)
- 9 (6) Sculpture of aspis consisting of dense, fine lines.
- 10 (15) Notogastral setae uniform, all nearly equal in length and in ciliation; setae ag_1 and ag_2 nearly equal in length.
- 11 (12) One pair of aggenital setae present** *rostrorugosa* (Hammer, 1979)
- 12 (11) Two pairs of aggenital setae present.
- 13 (14) Sensillus with 35-40 short branches. Notogaster with lineate or polygonate sculpture on its shoulder. Setae v_1 as long as v_2 *striata* (Mahunka, 1985)
- 14 (13) Sensillus with 12-15 long branches. Notogaster lacking ornamentation; setae v_1 only half as long as v_2 *lineata* Mahunka, 1987
- 15 (10) Notogastral setae of different length or ciliation, setae c_3 always much thinner than the others; setae ag_2 nearly four times longer than ag_1 *malaya* sp. n.
- 16 (1) Dorsal surface of aspis and of notogaster lacking lineate or striate sculpture, at most only some short lines observable on the laterobasal corner of the aspis.
- 17 (8) Setae c_3 fine, smooth and short, much shorter than the other notogastral setae; both pairs of aggenital setae fine and equal in length *heterotricha* Mahunka, 1987
- 18 (17) Notogastral setae uniform, setae c_3 similar to the others, both in length and ciliation; aggenital setae differ in length and/or ciliation.
- 19 (20) Ventral setae very short, distance between the two setae always greater than the length of a seta; setae v_1 strongly widened, originating far from anal aperture *spinosa* (Mahunka, 1987)
- 20 (19) Ventral setae much longer, at least five pairs of them longer than the distance between the two setae; setae v_1 setiform, and/or originating near to the anal aperture.
- 21 (22) Only one pair*** of aggenital setae present *pantotrema* (Berlese, 1913)
- 22 (21) Two pairs of aggenital setae present.

*: The lines on the aspis were not mentioned in the original description. The number of the branches on sensillus were designated as 25-32 by the author's mistake.

**: After Niedbala's redescription. So far I have only seen *Apoplophora* species with two pairs of aggenital setae.

***: On the basis of Niedbala's redescription. If he overlooked this feature, then probably (!) *A. pantotrema* is synonymous with *A. indica* (Mahunka, 1985).

- 23 (24) Sensillus with 11-12 branches. Exobothridial setae very long, not shorter than interlamellar ones *indica* (Mahunka, 1985)
 24 (23) Sensillus with 38-40 branches; exobothridial setae much shorter than the interlamellar ones *jaccoudi* sp. n.

Mesoplophora (Parplophora) paraleviseta sp. n.

Measurements. – Length of aspis: 158-164 μm , length of notogaster: 217-225 μm , height of notogaster: 106-117 μm .

Aspis: Surface lacking sculpture. All prodorsal setae thickened and long; their ratio: *ro* > *le* > *in* > *ex*, setae *ex* nearly half as long as setae *ro* (70 μm). All setae smooth. Sensillus long, with 19-21 very long branches, their length five times longer than the diameter of the sensillus (Fig. 22).

Notogaster: Eight pairs of long, mostly smooth or only finely roughened setae present, all nearly equal in length and similar in shape (Fig. 20).

Ventral side (Fig. 21): Setae of the ventral plate strongly varying in length and shape. One pair of thick setae, similar to notogastral setae, the other nine pairs very fine. Two pairs arising much farther from the anal aperture than the others. One pair of minute setae or their alveoli observable in aggenital position. Three pairs of anal and seven pairs (5+2) of genital setae, all simple and smooth.

Material examined: Holotype: i 74; 1 paratype: from the same sample. Holotype: MHNG, paratype (1297-PO-88): HHNM.

Remarks: The new species stands very near to *M. (P.) leviseta* Hammer, 1979, which has recently been redescribed by NIEDBALA (1985). I do not think, that Niedbala would have omitted mention of significant features such as ratio of prodorsal setae, very long branches on sensillus, number of the ventral setae. Therefore, on the basis of the following characters, I feel justified in describing a new species for the present material:

leviseta Hammer, 1959

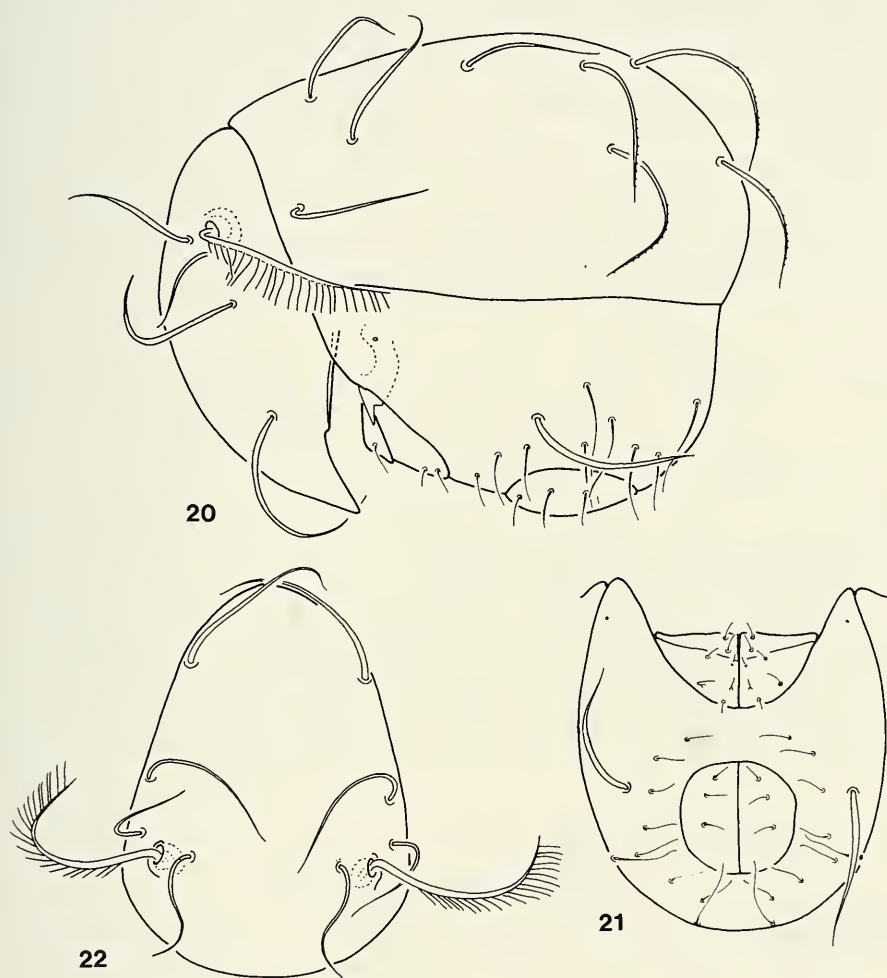
1. Setae *ex* > *in*.
2. Branches of sensillus normal in length, only three times longer than the diameter of the stalk of the sensillus.
3. Eight pairs of ventral setae.
4. Aggenital setae absent.

paraleviseta sp. n.

1. Setae *ex* < *in*
2. Branches of sensillus very long, five times longer than the diameter of the stalk of the sensillus.
3. Ten pairs of ventral setae.
4. One pair of aggenital setae present.

Hoplophorella scapellata Aoki, 1965

The specimens examined correspond very well with the original description and the figures given by AOKI on the basis of specimens from Thailand. NIEDBALA (1986b) synonymized the following three names: *H. africana* Wallwork, 1967, *H. baychandhuri* Subias et Sarkar, 1984 and *H. scapellata* Aoki 1965. I described from the Cape Verde Islands an additional species, *H. lienhardi* Mahunka, 1987, which also stands very near to this complex.



FIGS 20-22

Mesoplophora (Parplophora) paraleviseta sp. n. – 20: body from lateral view, 21: anogenital region, 22: aspis.

I have re-examined the type of *H. lienhardi* (fig. 25-26) and compared it with the Malaysian specimens. The following differences are conspicuous:

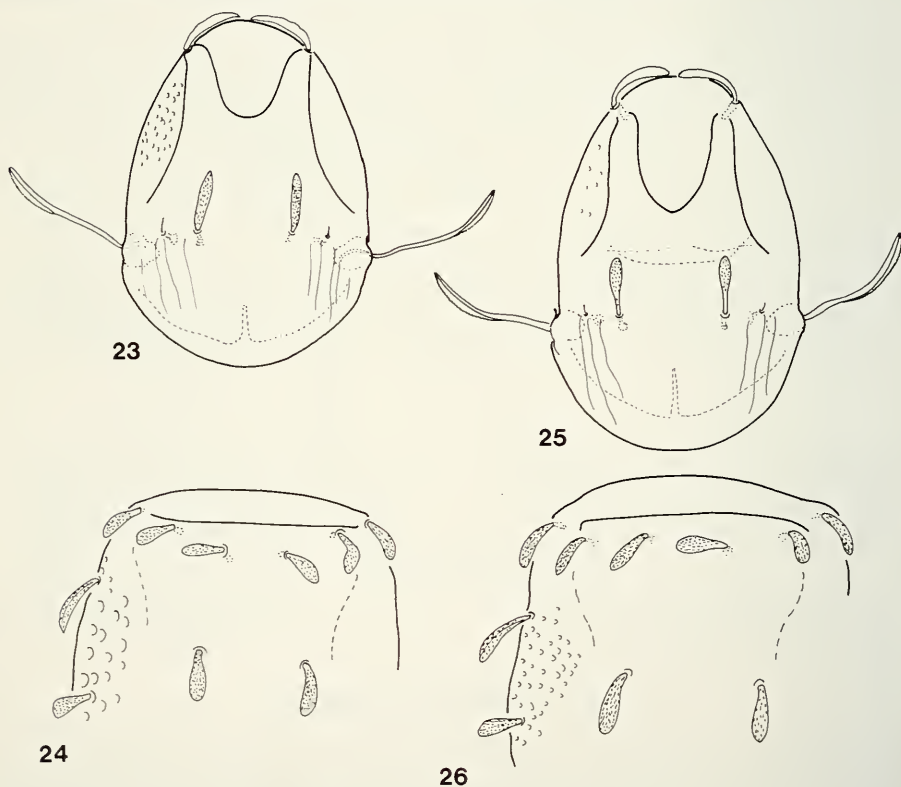
scapellata Aoki, 1965

1. Sculpture of notogaster consisting of large alveoli (Fig. 24).
2. Setae c_2 arising nearer to notogastral margin than c_1 .
3. Interlamellar setae without a peduncle (Fig. 23).
4. Median sinus-line between the rostral setae as shown in Fig. 23.

lienhardi Mahunka, 1987

1. Sculpture of notogaster consisting of small foveolae (Fig. 26).
2. Setae c_1 and c_2 originating nearly at an equal distance from the notogastral margin.
3. Interlamellar setae with peduncle (Fig. 25).
4. Median sinus-line between the rostral setae deep, as shown in Fig. 25.

Measurements of *H. scapellata* (specimens from Malaysia). – Length of aspis: 206-276 μm , length of notogaster: 398-512 μm , height of notogaster 275-359 μm .



FIGS 23-26.

Hoplophorella scapellata Aoki, 1965 – 23: aspis, 24: anterior part of notogaster from dorsal view.
Hoplophorella lienhardi Mahunka, 1987 – 25: aspis, 26: anterior part of notogaster from dorsal view.

Hoplophthiracarus minor sp. n.

Measurements. – Length of aspis: 169–198 μm , length of notogaster: 305–340 μm , height of notogaster: 198–233 μm .

Aspis: Outline in lateral view continuously convex. Lateral carina long, curving toward rostrum, but straight anteriorly and running parallel with the lateral margin (Fig. 29). Lateral rim strongly narrowed anteriorly. Rostral (34 μm) and interlamellar setae (51 μm) erect, the former ones bent slightly forwards, the latter backwards. All prodorsal setae – with the exception of the very fine exobothridial one – spinose. Sensillus clavate, its head lanceolate, covered with large spicules (Fig. 28).

Notogaster: Its surface sparsely alveolate, alveoli sometimes hardly observable. Fifteen pairs of notogastral setae present (Fig. 27), all erect, only slightly bent (Fig. 30) with some stronger spines on their distal end ($c_1 = 56 \mu\text{m}$) and some weaker ones medially. Setae c_3 stand slightly farther from the anterior margin of notogaster than c_1 , distance between the setae c_2 more than double that between c_1 . Lyrifissures ia and im large, ia situated behind setae cp , im near to h_3 , which originate unusually anteriorly, near to setae cp .

Anogenital region: Among the genital setae four pairs (g_5 – g_6) much longer than the others and standing in paraxial position (Fig. 31). Setae g_6 arising above setae g_5 . All setae of the ano-adanal plates (Fig. 33) different in length: an_1 (18 μm) < an_2 (24 μm) < ad_3 (35 μm) < ad_1 (43 μm) < ad_2 (56 μm), all slightly roughened. The surface of both pairs of plates nearly smooth, only some small foveolae observable.

Legs: Setae d of femur I thick, its distal end strongly curved and serrate (Fig. 34). Setae v' of trochanter much shorter than v' of femur. Solenidium ω_1 of leg I S-shaped. Solenidium ϕ of tibia IV longer than setae d (Fig. 32).

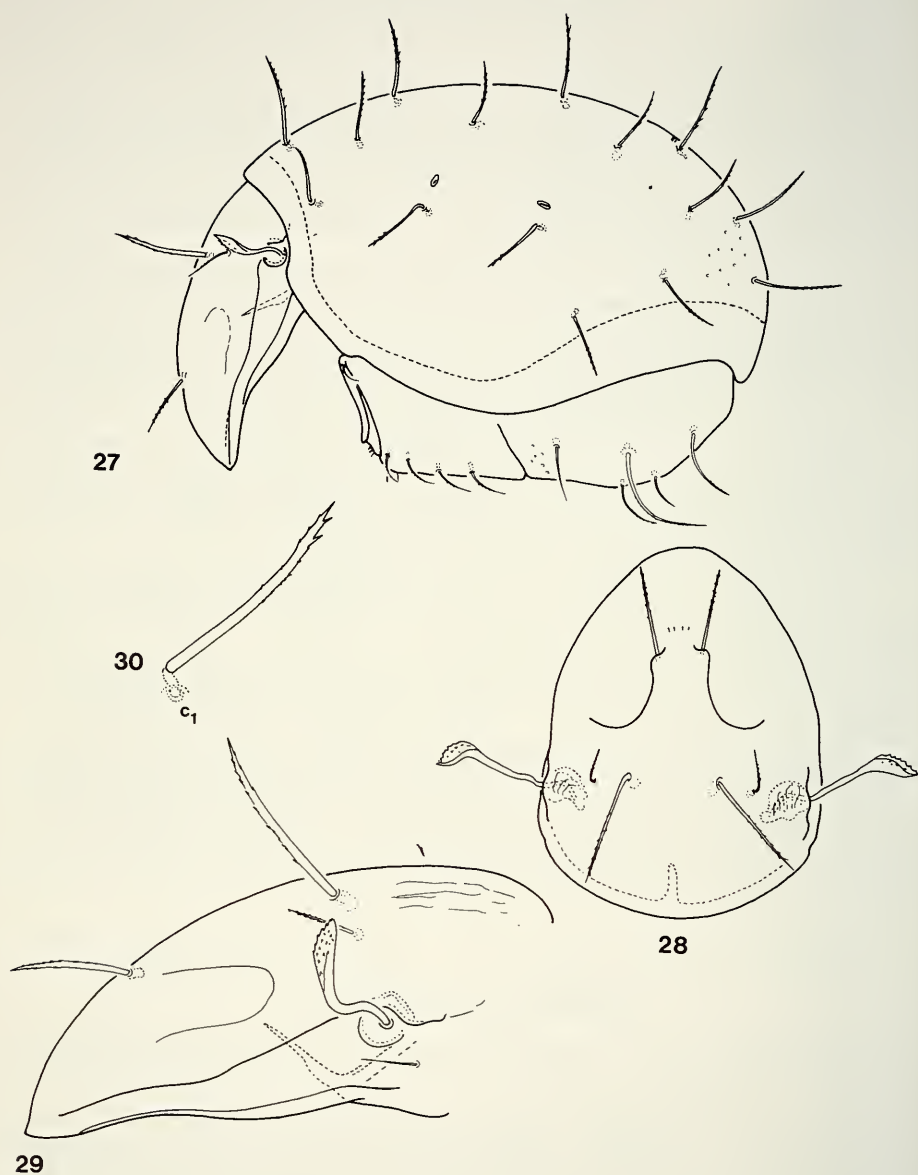
Material examined: Holotype: i 61; 5 paratypes: from the same sample; 7 paratypes: i 34. Holotype and 8 paratypes: MHNG, 4 paratypes (1298-PO-88): HNHM.

Remarks: The new species is related to *Hoplophthiracarus kugohi* Aoki, 1959. It is distinguished from the latter by the spiculate head of the sensillus, the spinose or ciliate rostral and lamellar setae, the ratio of the anal setae ($an_1 < an_2$) and the sculpture of the notogaster and of the anogenital region. It stands also near to *H. proximus* Niedbala, 1984, however, the latter has much longer (110 μm) interlamellar setae and its anal setae are equal in length.

Hoplophthiracarus nasalis sp. n.

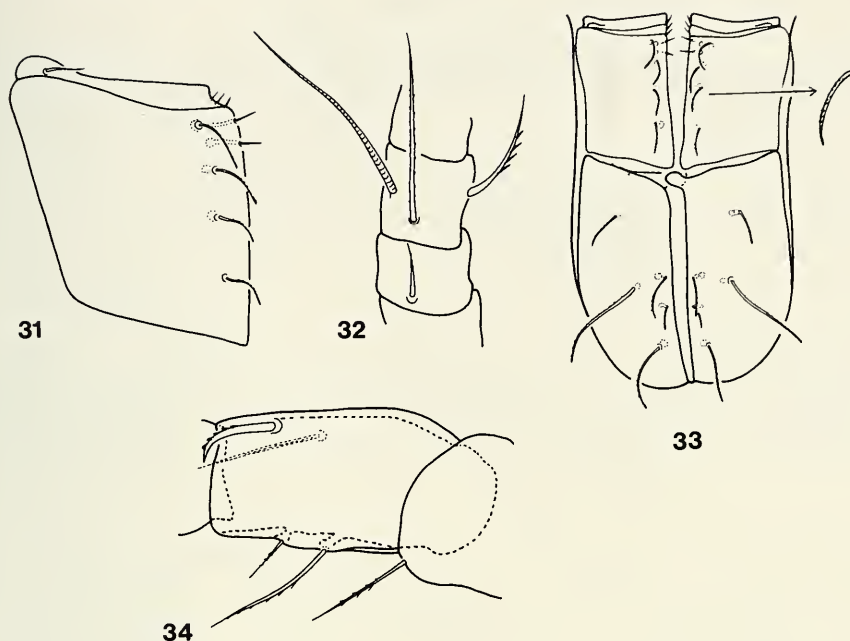
Measurements. – Length of aspis: 242–310 μm , length of notogaster: 452–623 μm , height of notogaster: 275–423 μm .

Aspis: Well developed, double crista present. Lateral carina and lateral rim short, but the preceding one continued in a thick and wide pseudo-lateral rim, which is ornamented by transversal ribs. Outline of rostrum striking, incised and excavate in lateral view (Fig. 40). Prodorsal surface smooth laterally, but alveolate medially and basally. Basal alveoli smaller than the median ones and sometimes fused into a longitudinal furrow (Fig. 39). All prodorsal setae – with the exception of the minute, spiniform exobothridial one – thick, roughened spiculate, the interbothridial one long and erect, its distal part also spinose (Fig. 38). Sensillus (Fig. 37) short, with a gradually widened head; its surface also spiculate.



FIGS 27-30.

Hoplophthiracarus minor sp. n. — 27: body from lateral view, 28: aspis, 29: aspis from lateral view, 30: seta c_1 .



FIGS 31-34.

Hoplophthiracarus minor sp. n. – 31: genital plate, 32: genu and tibia of leg IV, 33: anogenital region, 34: femur of leg I.

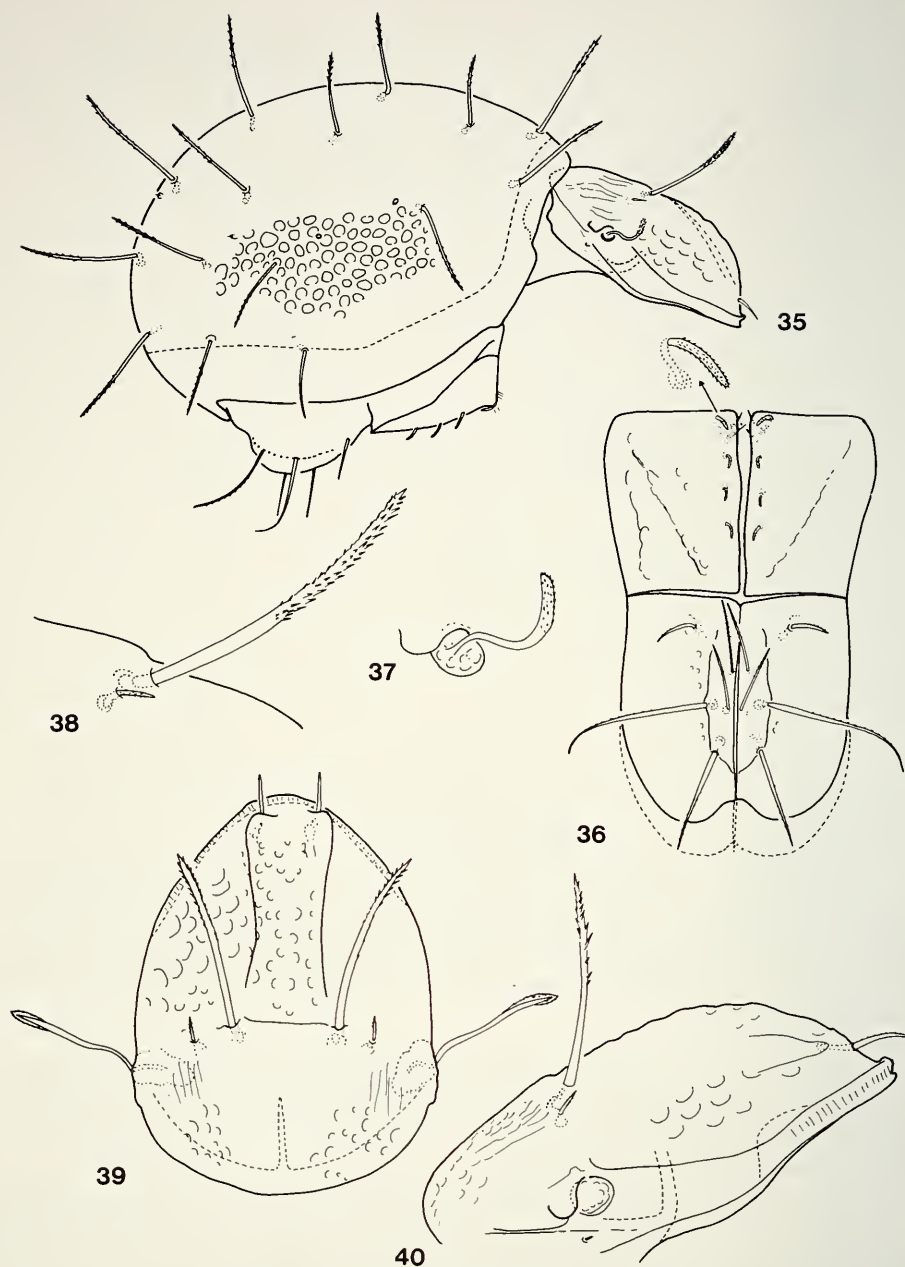
Notogaster: Its posterior end elongate like a short and thick tail. Whole surface ornamented by large, well-framed and deep alveoli. Fifteen pairs of strong, erect notogastral setae of various lengths (c_1 : 123 μm , d_1 : 96 μm , d_2 : 82 μm , p_1 : 136 μm , p_3 : 95 μm). Setae p_4 originating under the marginal line, setae p_3 above it. All setae spinose and spiculate on their distal part. Only two pairs of lyrifissures (ia , im) and the alveoli of the vestigial setae f_1 and f_2 observable (Fig. 35).

Anogenital region: Ano-adanal plates with a high, cristate median elevation (Fig. 36), anal and adanal setae arising on it. Genito-aggenital plates with a lateral edge. All ano-adanal setae and setae g_9 - g_6 characteristically spiculate or ciliate. Setae $an_1 = an_2 > ad_3$. Setae ad_2 the longest of all. Setae g_9 - g_6 directed backwards, g_6 strongly curved. The distance between setae g_4 and g_3 very great.

Legs: Setae d of femur I hooked, this part serrate, setae v' very long, four times longer than v'' . Setae d on tibia of leg IV much shorter than solenidion ϕ .

Material examined: Holotype: i 100, 18 paratypes: from the same sample. Holotype and 11 paratypes: MHNG, 7 paratypes (1299-PO-88): HNHM.

Remarks: On the basis of the characteristic structure of the ano-adanal and genital plates, and/or the shape of the genital setae (g_9 - g_6) the new species is easily distinguished from all related *Hoplophthiracarus* species.



FIGS 35-40.

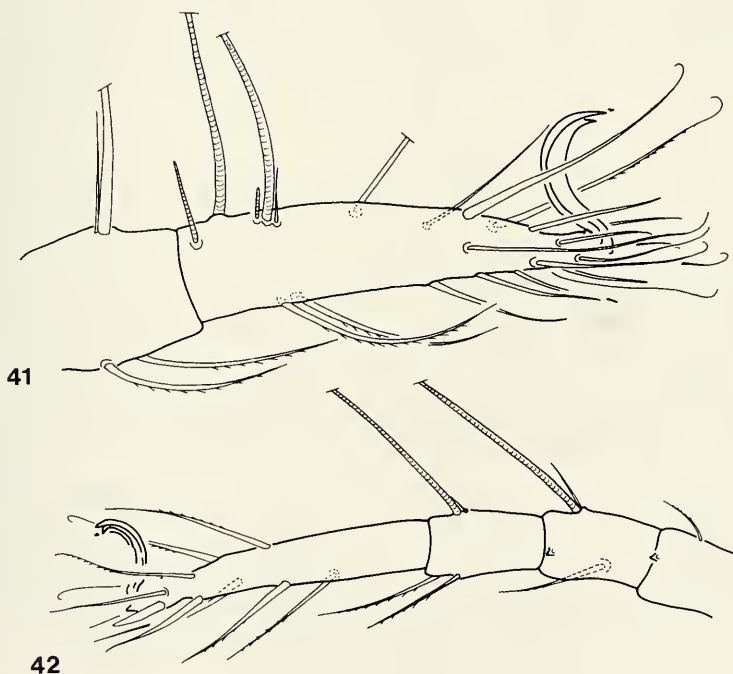
Hoplophthiracarus nasalis sp. n. — 35: body from lateral view, 36: anogenital region, 37: sensillus, 38: setae *in* and *le*, 39: aspis, 40: aspis from lateral view.

***Austrotritia shealsi* Mahunka, 1987**

In the original description the epimeral and leg chaetotaxy was not mentioned. I have examined it in the present material, and on this basis I give the epimeral setal formula: 3-1-2-2, the number of solenidia:

Epimeral	Legs: chaetotaxy of setae
I: 2-1-3	I: 1-4-4-5-21-3
II: 1-1-2	II: 1-4-3-3-17-3
III: 1-1-0	III: 3-2-3-3-14-3
IV: 1-1-0	IV: 3-2-2-3-11-3

R e m a r k s : This formula is much the same as in *A. kinabaluensis* Ramsay & Sheals, 1969 (sensu AOKI [1980a]), however, in *shealsi* the genu of leg I has only 2, the genu of leg II only 3 setae. In *A. shealsi* the femur and genu of leg IV has a sharp spine near to the distal end (Fig. 42). The insertion of solenidia of tarsus I in *A. shealsi* is similar to *A. unicarinata* Aoki, 1980, but in *shealsi* famulus ϵ is rounded (Fig. 41).



FIGS 41-42.

Austrotritia shealsi Mahunka, 1987 – 41: tibia and tarsus of leg I, 42: leg IV.

***Rhsotritia clavata spiculifera* sp. n.**

Measurements. – Length of aspis: 192-231 μm , length of notogaster: 359-458 μm , height of notogaster: 235-344 μm .

Aspis: One pair of simple lateral carinae present, lateral rim long, carina and rim fused. Bothridial squama large, consisting of two parts, anterior part triangulate (Fig. 43), much larger than posterior part. Prodorsal setae, especially the interlamellar ones, very long (140 μm), ciliate (Fig. 44). Sensillus (Fig. 45-47) with a well-separated, plum-stone-shaped head, distal end spinose.

Notogaster: Notogastral setae fine, ciliate distally. Their length varying, but no important differences among them: c_1 : 53 μm , d_1 : 38 μm , p_3 : 48 μm (Fig. 43).

Anogenital region (Fig. 49): Median triangle large and long. Nine pairs of genital and two pairs of short aggenital setae present. Setae on the ano-adanal plates characteristic, setae an_2 always directed backwards, an_1 forwards. Among the three pairs of adanal setae one pair (ad_1) much shorter than the other two pairs, and blunt at tip (Fig. 48).

Eggs: As shown in Fig. 50.

Legs: All legs monodactylous.

Material examined: Holotype: i 85; 6 paratypes: from the same sample; 3 paratypes: i 34; 3 paratypes: i 100. Holotype and 8 paratypes: MHNG, 4 paratypes (1300-PO-88): HHNM.

Remarks: Differential diagnosis will be given after the last *Rhsotritia* species.

***Rhsotritia divida* sp. n.**

Measurements: – Length of aspis: 216-265 μm , length of notogaster: 437-575 μm , height of notogaster: 275-378 μm .

Aspis (Fig. 54): Outline convex posteriorly, concave anteriorly; anterior part wide. One strong lateral carina present but near to the rostrum a short second one also well visible (Fig. 51). Lateral rim fused with both carinae. Prodorsal setae – with the exception of the minute ex – strong, erect and blunt at tip; their distal half distinctly ciliate. Sensillus without conspicuously dilated head, its distal part densely spinose (Fig. 55).

Notogaster: Fourteen pairs of strong notogastral setae, blunt at tip, and four pairs (ia , im , ih and ips) of lyrifissures present. All setae distinctly ciliate distally (Fig. 51).

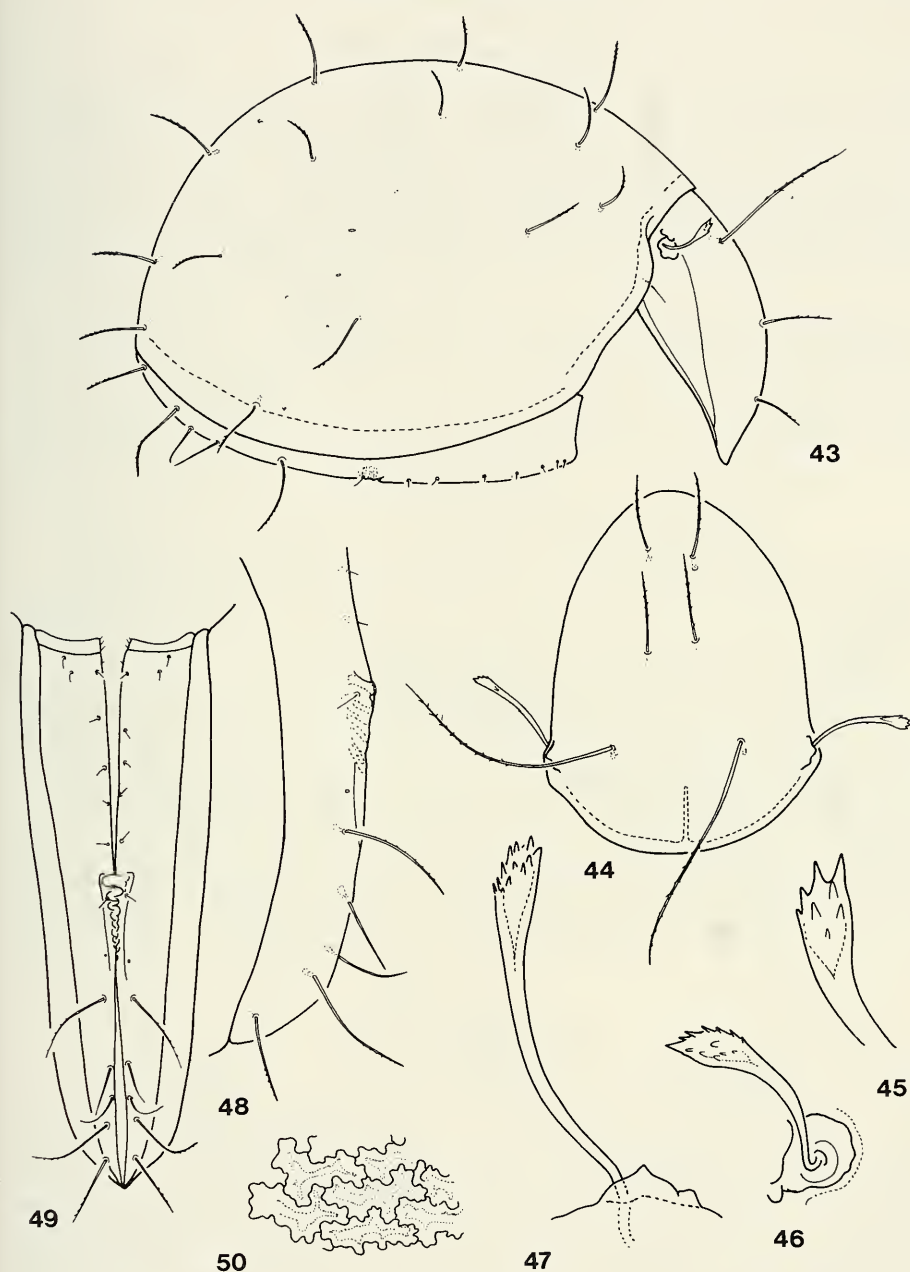
Anogenital region (Fig. 52): Nine pairs of genital, two pairs of minute aggenital, three pairs of anal and three pairs of adanal setae present. Among the latter setae ad_1 the longest of all. All blunt and roughened or ciliate. Lyrifissure iad opening near setae ad_1 , far anteriorly, much nearer to the triangle than to the other anal setae.

Eggs: Their surface ornamented by irregular fields as shown in Fig. 53.

Legs: All legs monodactylous.

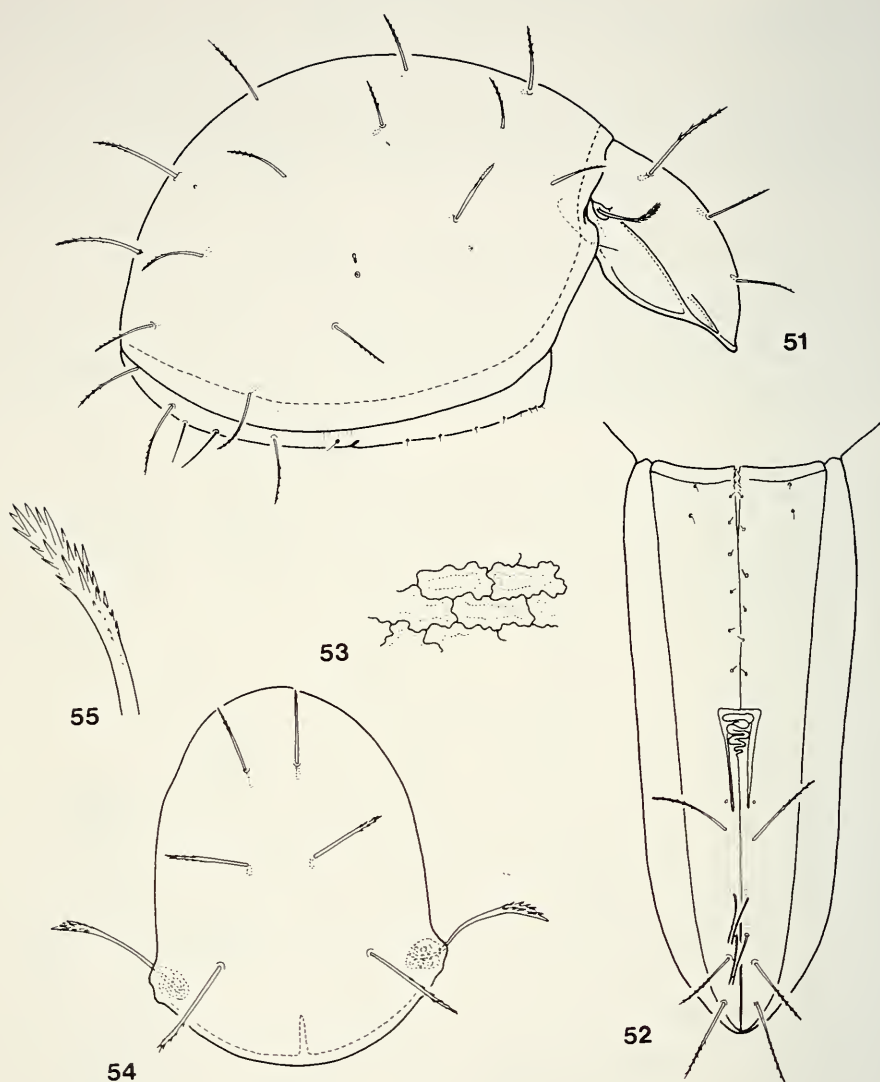
Material examined: Holotype: i 34; 1 paratype: from the same sample. Holotype: MHNG, paratype (1301-PO-88): HHNM.

Remarks: Differential diagnosis will be given after the last *Rhsotritia* species.



FIGS 43-50.

Rhysotritia clavata spiculifera ssp. n. — 43: body from lateral view, 44: aspis, 45-47: sensillus from various views, 48: anogenital region from lateral view, 49: anogenital region from ventral view, 50: sculpture of egg.



FIGS 51-55.

Rhysotritia divida sp. n. — 51: body from lateral view, 52: anogenital region, 53: sculpture of egg, 54: aspis, 55: end of sensillus.

***Rhysotritia hauseri* sp. n.**

Measurements. – Length of aspis: 246–285 μm , length of notogaster: 510–607 μm , height of notogaster: 318–453 μm .

Aspis (Fig. 60): Outline convex basally, concave anteriorly. One strong lateral carina present, fused with the wide lateral rim. Bothridial squama very large, their lateral margin waved (Fig. 56). Prodorsal setae – with the exception of exobothridial ones – strong, long and blunt at tip. Their distal third strongly spinose. Sensillus with well dilated head, this part also spinose, like a "brush" (Fig. 58).

Notogaster: Among the setae characteristic differences in length exists, e.g. setae cp and h_3 (85 μm) much longer than setae d_1 (60 μm), d_2 (51 μm) or e_2 . All setae thick, blunt at tip and well spiculate on their distal end. Four pairs of lyrifissures present (Fig. 56).

Anogenital region (Fig. 57): Two pairs of minute aggenital, 9 pairs of stronger genital setae present. On the ano-adanal plates six pairs of setae are visible, among them ad_1 the longest, $ad_2 = ad_3$, but an_1 shorter than an_2 .

Legs: Leg I with two, legs II–IV with three claws.

Eggs: Their surface is shown in Fig. 59.

Material examined: Holotype: i 100; 5 paratypes: from the same sample; 6 paratypes: i 85; 3 paratypes: i 96. Holotype and 9 paratypes: MHNG, 5 paratypes (1302-PO-88): HHNM.

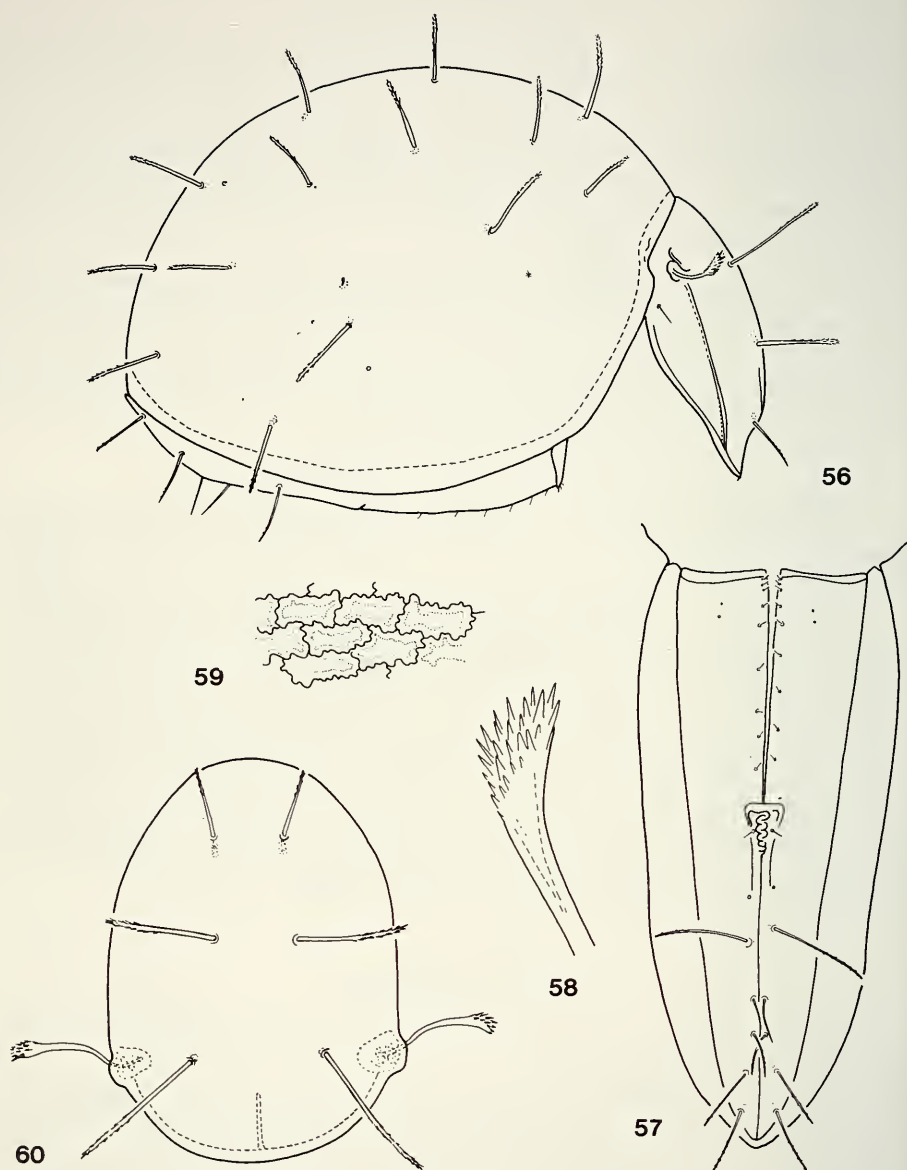
Remarks: The Malaysia sample examined included three *Rhysotritia* Märkel & Meyer, 1959 species. Two of them have monodactylous legs, one of them bi- (leg I) or tridactylous legs (II–IV). Until now this genus included only one monodactylous species (*R. clavata* Märkel, 1964), so far known from South America. One of the taxa here described stands very near to it and is considered as a new subspecies; it is distinguished from *clavata* s. str. only by the spiculate head of its sensillus and by a slightly different ratio among the setae of the ano-adanal plates. The other monodactylous species (*divida*) is distinguished from *clavata* by the shape of the lateral carina and the form of the sensillus. The heterodactylous species (*hauseri*) belongs to the *ardua*-species group, and it stands near to *Rh. ardua penicillata* Pérez-Iñigo, 1969; however, the latter has many fewer spines on the head of the sensillus, and its notogastral setae are not blunt at the tip.

***Sumatrotritia elegans* sp. n.**

Measurements. – Length of aspis: 260–350 μm , length of notogaster: 477–581 μm , height of notogaster: 345–424 μm .

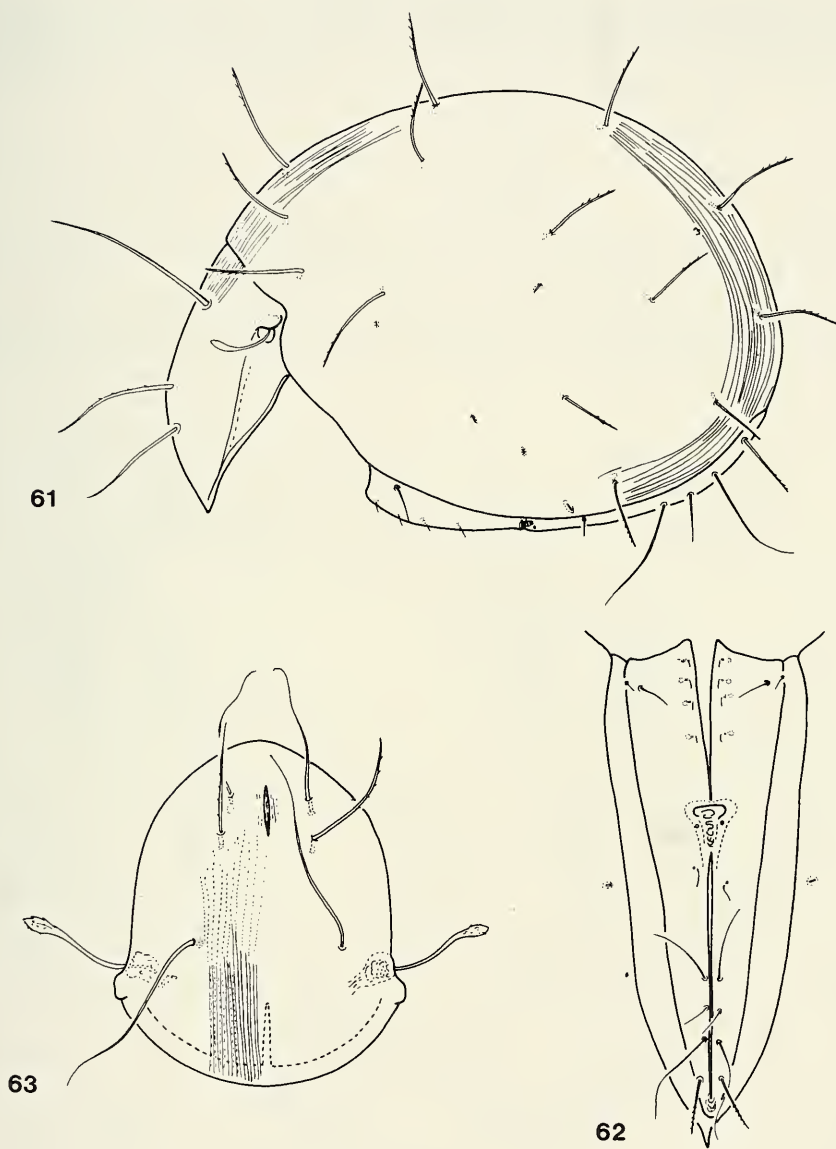
Aspis: A short, low crista present. Surface ornamented by striae, with punctures. These gradually disintegrate anteriorly and disappear in the rostral region (Fig. 63). Rostral setae originating far from rostrum and near to lamellar setae. The distance between the rostral and lamellar setae much shorter than that between the lamellar and interlamellar setae. Rostral and interlamellar setae long, flagellate and smooth, lamellar setae much shorter, blunt at tip and distinctly ciliate. Sensillus clavate, its head spiculate (Fig. 63).

Notogaster: Surface ornamented by striae, like the aspis basally. Fourteen pairs of notogastral setae present, all blunt at tip, finely ciliate, like lamellar setae. Setae d_1 , d_2 , e_2 and p_{1-3} shorter than the others. Five pairs of lyrifissures visible (Fig. 61). Only insertion of the vestigial setae f_1 visible.



FIGS 56-60.

Rhysotritia hauseri sp. n. — 56: body from lateral view, 57: anogenital region, 58: end of sensillus, 59: sculpture of egg, 60: aspis.



FIGS 61-63.

Sumatrotritia elegans sp. n. : 61: body from lateral view, 62: anogenital region, 63: aspis.

Coxisternal region: Epimeral setal formula: 2-0-1-1.

Anogenital region: Four pairs of genital and one pair of aggenital setae present, the latter much longer than genital setae. Ano-adanal plates with six pairs of setae. Setae a_1 represented only by their alveoli, great differences exist among the other setae (Fig. 62).

Legs: Chaetotaxy of setae:

I (Fig. 64): 1-2-4-5-15-1

II (Fig. 65): 1-2-3-2-14-1

III: 1-2-2-10-1

IV: 1-1-1-2-10-1

Solenidial chaetotaxy:

I: 2-1-3

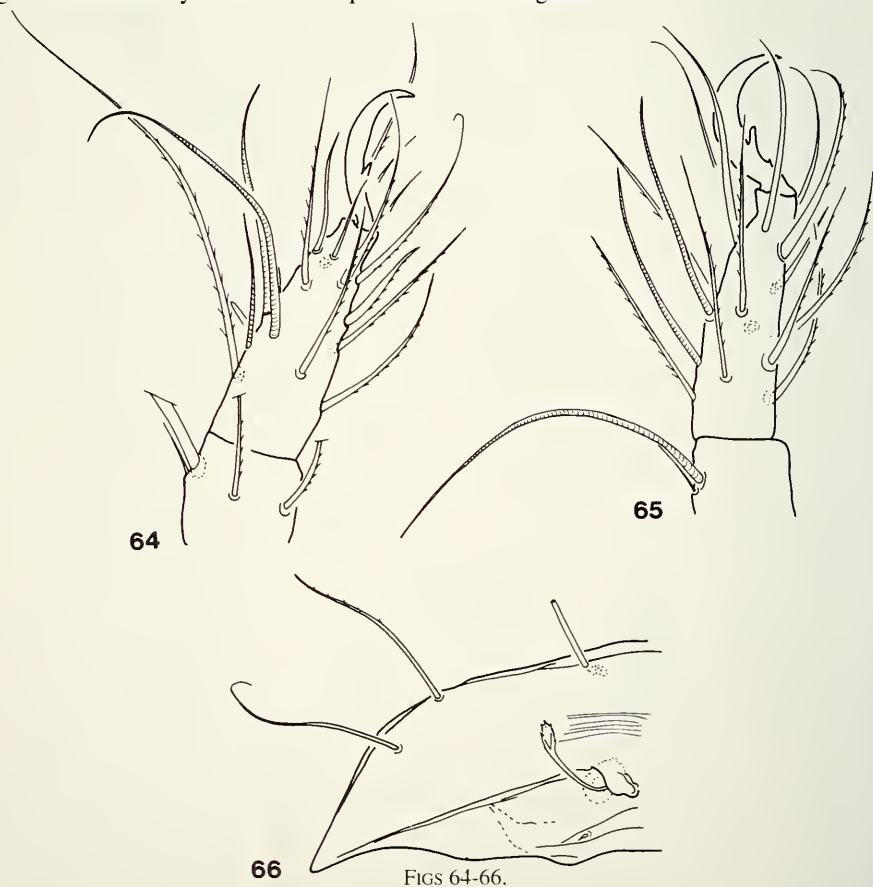
II: 1-1-2

III: 1-1-0

IV: 0-1-0

Material examined: Holotype: i 96; 4 paratypes from the same sample. Holotype and 3 paratypes: MHNG, 1 paratype (1303-PO-88): HNHM.

Remarks: The new species resembles the type species (*Sumatrotritia xena* Mahunka, 1989) of the recently described genus. It is distinguished from it by the very short genital setae and by the ratio of the prodorsal and notogastral setae.



FIGS 64-66.

Sumatrotritia elegans sp. n. — 64: tibia and tarsus of leg I, 65: tibia and tarsus of leg II, 66: aspis from lateral view.

A s p i s : Surface sharply punctate, lateral margin smooth. Two pairs of fine lateral carinae present, the upper one longer, strongly curving toward the rostrum anteriorly (Fig. 68), the lower one not connected with it. Lateral rim very strong. Bothridial squama small, situated behind the bothridium. Prodorsal setae – with the exception of the exobothridial one – long and thick, setae *ro* originating far from rostrum, setae *le* in front of *in*. Their ratio: *in* < *le* < *ro*, setae *ex* comparatively long, but fine. Sensillus setiform, with a finely serrate velum.

N o t o g a s t e r : Surface densely foveolate. Fourteen pairs of long and strong notogastral setae present, all with a median edge. Setae *c*₁ originating much closer to the collar line than *c*₂ and *c*₃. Four pairs of very small lyrifissures present, *ia* opening near insertion of setae *cp*; *im*, *ip* and *ips* in one group in front of setae *h*₃ and *p*₃. Insertion of the vestigial setae *f*₁ and *f*₂ not observable (Fig. 67).

C o x i s t e r n a l r e g i o n : Epimeral setal formula: 3-0-1-2; setae *lb* several times longer than *la* and *lc* (Fig. 69).

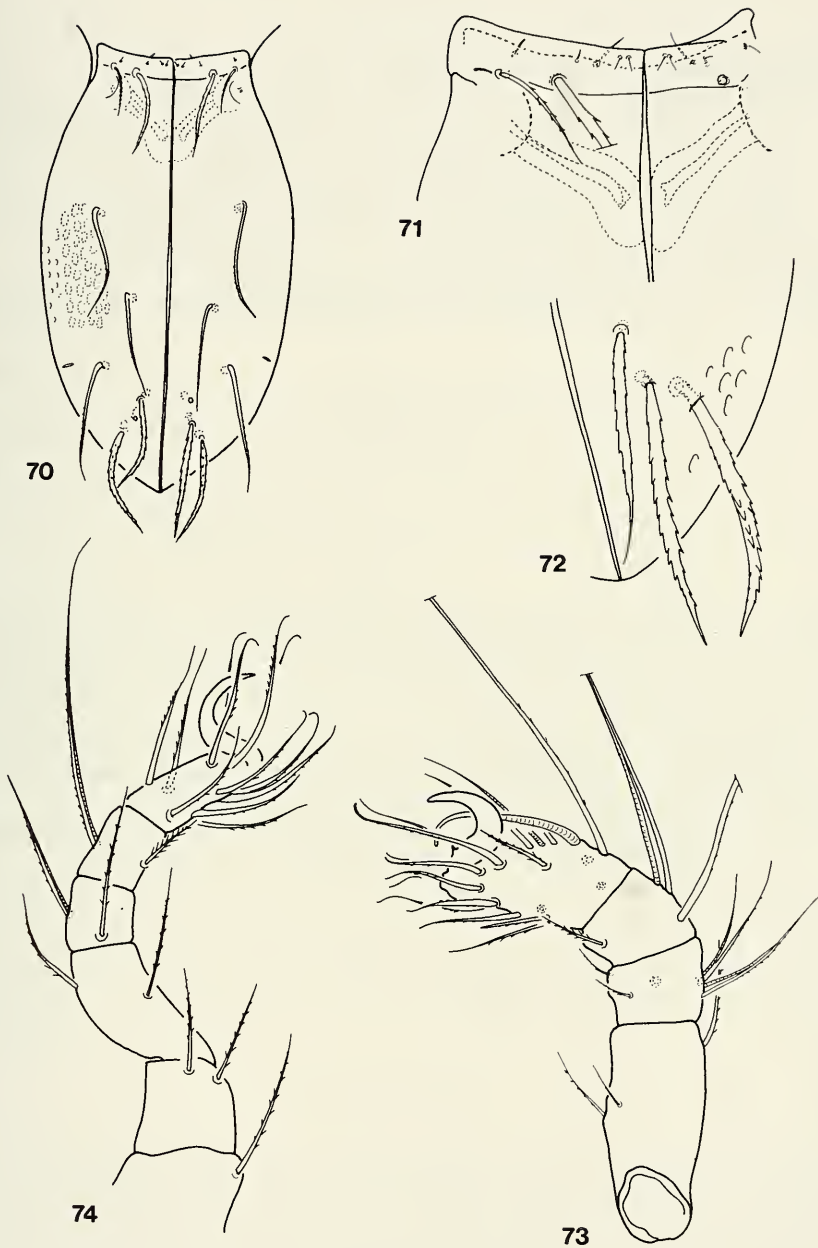
A n o g e n i t a l r e g i o n (Fig. 70): Form and chaetotaxy similar to the type species of the genus *Sabahtritia* Mahunka, 1987. Five pairs of minute genital setae (one of them arising on the anterior margin, four of them on the dorsal surface), and two pairs of very strong aggenital setae present. A characteristic nozzle or tube-shaped formation (Fig. 71) present on the inner side of the plates. Three pairs of long and strong anal and three pairs of similar adanal setae observable, the latter thicker than the preceding ones and characteristically ornamented by large spicules and a serrate margin (Fig. 72). Lyrifissures *iad* opening in the posterior half of the anogenital plates, far laterally.

L e g s : Chaetotaxy of all legs strongly reduced.

Setal formula:		Solenidial formula:	
I (Fig. 73):	1-3-5-4-16-1	I:	2-1-3
II:	1-2-3-?-?-1	II:	1-1-2
III (Fig. 74):	2-2-2-2-12-1	III:	1-1-0
IV:	2-1-0-3-10-1	IV:	0-1-0

M a t e r i a l e x a m i n e d : Holotype: i 74; 2 paratypes: from the same sample. Holotype and 1 paratype: MHNG, 1 paratype (1304-PO-88): HNHM.

R e m a r k s : On the basis of the strongly reduced genito-aggenital plates and the characteristic genital formation on the plates the new species belongs to the genus *Sabahtritia* Mahunka, 1987 and it stands very far from the type species (*S. hauseri*), the setae of the dorsal and anogenital region adequately distinguish the two species, since these setae of the newly described species are slender and sharply pointed, while the same in *hauseri* robust and blunt at tip.



FIGS 70-74.

Sabahtrititia mirabilis sp. n. — 70: anogenital region, 71: anterior part of anogenital region, 72: posterior part of the anogenital region, 73: leg I, 74: leg III.

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